

FLOATING MAGNETS

I. Science Topic Area Physical science:
magnetism,
magnetic poles

Math Topic Area Measuring length

II. Introductory Statement

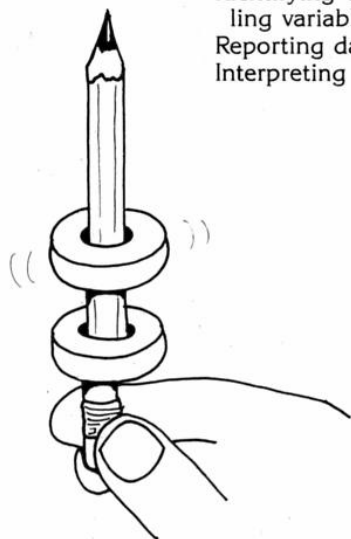
Students will experiment with two or more stacked ring magnets, observing how they interact with one another.

III. Math Content

Measuring length

Science Processing Skills

Observing
Making & testing
hypotheses
Identifying & control-
ling variables
Reporting data
Interpreting data



IV. Materials

For each group:

Pencils

Ring magnets, at least 1 per person

Optional clay

V. Key Question

What would happen if you put two ring magnets on an upright pencil?

VI. Background Information

Each magnet has a magnetic field, with the strongest magnetic force at its poles. Normal magnets have two poles; in industry or research they may have more but usually an even number. If two magnets are placed *facing* each other with like magnetic poles together, they will repel; if unlike poles are together, they will attract. Ring magnets have one pole on each flat side. See *Science Information* beginning on page 92.

VII. Management

1. Students should work in cooperative learning groups so that they can combine their magnets for explorations.
2. The optional clay would be used as a base for pencils to add stability.

VIII. Procedure

1. Ask the *Key Question*: "What would happen if you put two ring magnets on an upright pencil?"
2. Students discuss their predictions.
3. Provide time for students to investigate with two magnets for each pencil. How close were predictions to what actually happened? On activity sheets draw magnets attracting and repelling each other.
4. Encourage students to fill their pencils with floating magnets, and then draw what happens on the activity sheet.
5. Encourage students to arrange various numbers of magnets in various ways. What patterns do you see in the behavior of the magnets and the spaces?

IX. Discussion

1. Why does the magnet float on one side and not on the other?
2. Where is the north-seeking pole on a ring magnet? ... the south-seeking pole?
3. What would happen if the pencil weren't there?
4. What happens to the spaces between magnets as you add more?
5. Can you make the magnets bounce?
6. How can you make the top magnet jump off the pencil?

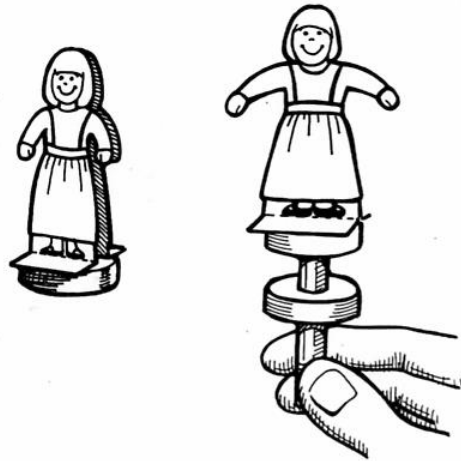
X. Extensions

1. Using a long dowel, float all available magnets from the whole class.
2. Measure (metrically or in customary units) the space between floating magnets with one magnet and then with more magnets on top. What is the pattern?
3. Have students create a *labor-saving invention* which makes use of floating magnets.
4. Make a *piston* using several floating magnets in a plastic pill container. (You can also use a 35 mm film container, but use at least 4 magnets or line it with a thick piece of paper, something to prevent magnets from flipping over.)
5. Try stacking 2, 3, or 4 magnets in different patterns of attracting and repelling.

XI. Curriculum Correlations

Creative writing/music: Have students write words for a song, *I'm Foreveer Floating Magnets* (instead of "I'm Forever Blowing Bubbles").

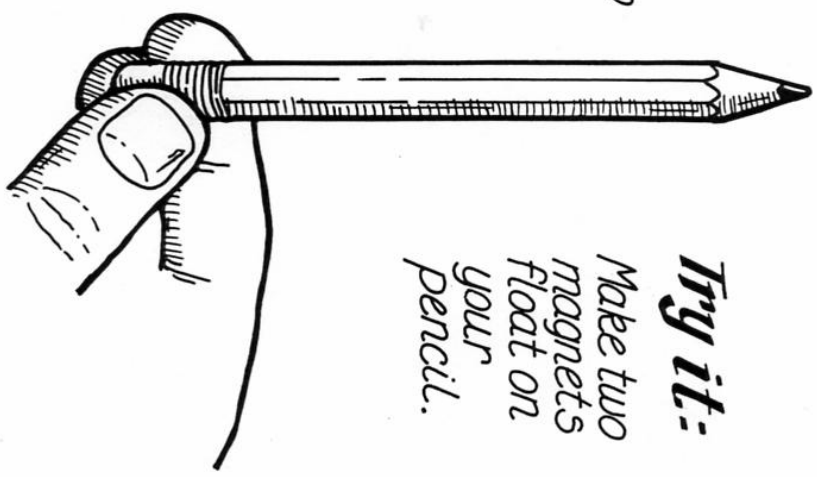
Art: Design and build a *dancing puppet* for your pencil. Draw a figure at least 6 cm wide and 10 cm tall, leaving 1 cm across the bottom for a base. Cut with paper double, so you will have a back. Color the back as the back of the doll. Fold bases forward. Staple or glue top and sides of doll together, but leave base and bottom center open. Tape or glue bases of doll to a magnet. Put 1 magnet on the pencil with pole upward which repels the doll magnet. Place doll magnet on top. make the doll *dance* by jiggling the pencil (and bottom magnet) up and down.



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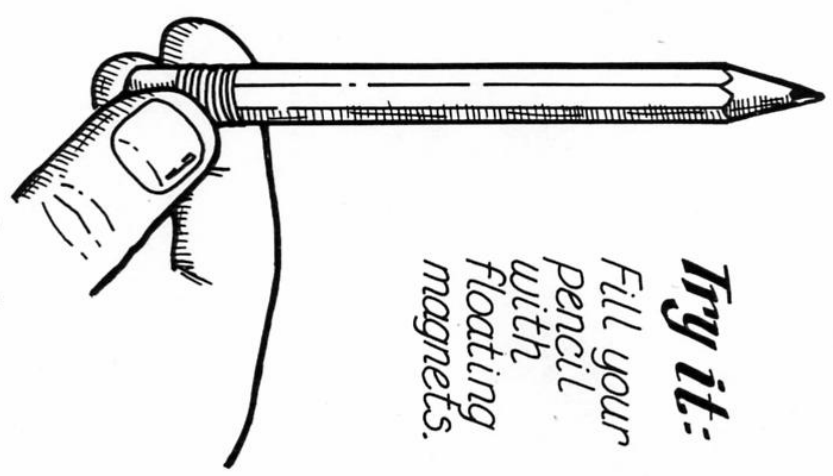
Try it:

Make two magnets stick together on your pencils.



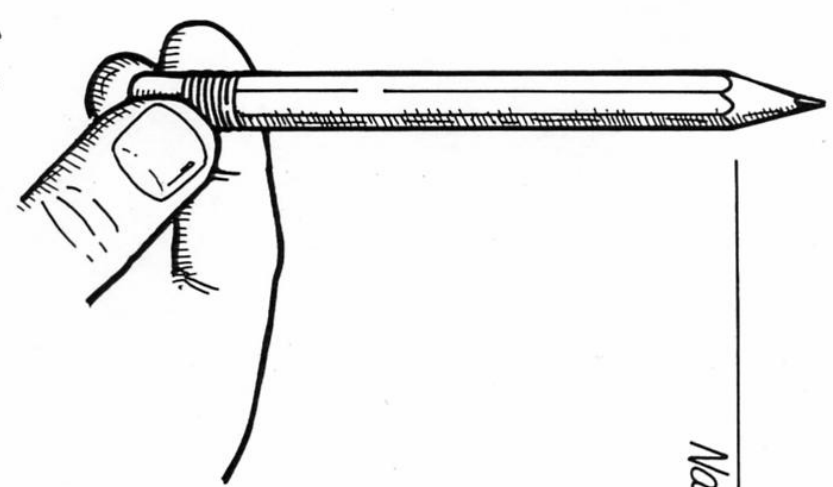
Try it:

Make two magnets float on your pencil.



Try it:

Fill your pencil with floating magnets.



Name

Draw a picture of what you did.

Now try this: Using what you have learned, make a magnet pop off your pencil. How did you do it?
